From Mice to Men: Genetic Doping in International Sports

Kristin Jo Custer
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By Kristin Jo Custer*

Introduction

Olympism is a philosophy of life, exalting and combining in a balanced whole the qualities of body, will and mind. Blending sport with culture and education, Olympism seeks to create a way of life based on the joy of effort, the educational value of good example and respect for universal fundamental ethical principles.1

Passion for sports transcends race, gender, physical disability, and geographic barriers. Why are so many people, of all ages and sizes, from countries all over the world, fascinated with sports? Is it the competition and suspense of not knowing who will win? Is it admiration of mental toughness and determination? Is it awe of the physical prowess of athletes? Whatever drives the appeal of sports often pushes athletes to do whatever it takes to be the best.

This note addresses various legal implications of the rising threat of genetic doping in international sports, specifically applied to the Olympic Games. Section I outlines the history of doping, describes the general emergence of genetic doping in the athletic arena, and considers the growing pressures on athletes to engage in doping. Section II examines the hierarchy of authority in international sports, and Section III describes anti-doping efforts. Section IV examines issues and unique concerns involved in the fight against genetic doping, and includes various recommendations for handling these problems.

*J.D. candidate, May 2007, University of California, Hastings College of the Law.

I. Use of Performance-Enhancing Substances in Sports

A. A History of Doping in International Sporting Events

Although the term "doping" generally evokes thoughts of recent scandals in sports, the practice of using substances to improve performance in athletic competition is as old as competitive sport itself. Doping is the deliberate or inadvertent use of a performance-enhancing substance by an athlete. While it has developed over time with scientific technology, doping has very primitive roots. Ancient Greek athletes often modified their diets to include food and other substances known to enhance performance. Athletes consumed caffeine, cocaine, strychnine, and alcohol to increase endurance in the 19th century. It was not until the 1920s, however, that an athletic organization took steps to restrict drug use in sports.

In 1928, the International Amateur Athletic Federation took the first measure as an International Sport Federation (IF) to ban doping. Although technically banned, doping still continued because no testing was done to ensure the ban was effective. Other IFs followed suit in prohibiting doping, but no testing was performed by any of the organizations. Synthetic hormones were invented in the 1930s and their use in sports began in the 1950s, exacerbating doping problems.

IFs first began administering tests for doping in World Championships in 1966 with the International Cycling Union (UCI) and the Federation Internationale de Football Association (FIFA). In 1967 the International Olympic Committee's (IOC) Medical Commission promulgated its first list of banned substances. The

3. Id.
4. Id.
5. Id.
6. Id.
7. Id.
8. Id.
9. Id.
10. Id.
11. Id.
12. Id; see also International Olympic Committee, The Medical Commission, at <www.olympic.org/uk/organisation/commissions/medical/index.uk.asp> (visited Nov.
The 1968 Summer Olympic Games in Mexico saw the first drug testing and disqualification in the modern pentathlon when Swede Hans-Gunnar Liljenwall tested positive for excessive alcohol. According to Liljenwall, he had two beers to calm his nerves before the pistol shooting portion of his event. The Swedish team, after winning the bronze, was forced to return its medals. Later, in the 1972 Summer Olympics in Munich, fourteen modern pentathletes tested positive for tranquilizers. They were not disqualified, however, because the substances were not on the IOC's list of banned substances. The tranquilizers were, nevertheless, banned by the International Modern Pentathlon Union, the governing IF for the sport.

By the 1970s, the use of anabolic steroids was booming, especially in events requiring great strength, such as weightlifting and track and field throwing events. Until 1974, no reliable testing method for steroids existed, even though most IFs had introduced drug testing by this time. With the introduction of a dependable testing method, the number of disqualifications due to drugs increased dramatically in the late 1970s.

In the 1980s, a scandal emerged in the international athletic world which complicated anti-doping efforts: government-sponsored doping. The East German government was behind a doping scandal and cover-up involving nearly 10,000 athletes. The government implemented "State Plan 14.25," a secret initiative to develop sports nationwide by providing steroid pills to coaches, who in turn gave them to unknowing athletes in their daily dose of vitamins.

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8, 2006).

15. Id.
16. Id.
17. Id.
19. Id.
20. Id.
21. Id.
22. Kevin Van Valkenburg, Gene Doping Looms as Next Sports Edge: Boost at Cellular Level is All but Undetectable, BALTIMORE SUN, Jan. 16, 2005, at 1A.
German athletes were also given testosterone injections under the premise that the injections were "vitamin cocktails."\textsuperscript{24}

The case of Ben Johnson shook the athletic world at the 1988 Seoul Olympics. Olympic authorities stripped Johnson of his gold medal for the 100-meter event after he tested positive for anabolic steroids.\textsuperscript{25} His case heightened the world’s awareness of the need to rid sports of doping.\textsuperscript{26}

More recently, the 1998 Tour de France marked the eruption of a major scandal in cycling. French customs arrested Willy Voet, a soigneur of the Festina cycling team, for the possession of illegal quantities of prescription drugs and narcotics, including erythropoietin (EPO), growth hormones, testosterone, and amphetamines.\textsuperscript{27} This led to further raids of the team’s hotel rooms, where more doping products were found.\textsuperscript{28} Cyclists responded with a “sit-down strike” in which they refused to ride, and some teams quit the Tour altogether.\textsuperscript{29} Later, Voet wrote a book revealing many common doping practices of the cycling world.\textsuperscript{30} He was criminally prosecuted and his trial revealed that managers of the Festina team had organized doping for the riders.\textsuperscript{31} The team had hired a physician to regulate steroid use because it was safer for athletes to engage in doping with medical advice, rather than on their own with no supervision.\textsuperscript{32} The team argued that doping was widespread within the cycling world at the elite level.\textsuperscript{33} This scandal was the driving force behind the subsequent creation of the new World Anti-Doping Agency.\textsuperscript{34}

\begin{itemize}
  \item \textsuperscript{24} \textit{Id.}
  \item \textsuperscript{25} World Anti-Doping Agency, A Brief History of Anti-Doping, \textit{supra} note 2.
  \item \textsuperscript{26} \textit{Id.}
  \item \textsuperscript{27} Wikipedia Online Encyclopedia, Tour de France: Doping Scandals, at <en.wikipedia.org/wiki/Tour_de_France#Doping_scandals> (visited Nov. 8, 2006). A soigneur is a non-riding member of a bicycling team whose role is to provide support for the riders, which could include transportation and organization of supplies, preparation of the team’s food, post-ride massages, and personal encouragement.
  \item \textsuperscript{28} \textit{Id.}
  \item \textsuperscript{29} \textit{Id.}
  \item \textsuperscript{30} \textit{Id.}
  \item \textsuperscript{31} \textit{Id.}
  \item \textsuperscript{32} \textit{Id.}
  \item \textsuperscript{33} \textit{Id.}
\end{itemize}
Many new doping techniques and technologies have developed over the years, including advancements in blood doping and EPO. The future of performance enhancement, however, lies in the form of gene manipulation, or "genetic doping." The World Anti-Doping Agency’s 2006 List of Prohibited Methods characterizes genetic doping as "the non-therapeutic use of genes, genetic elements, or of the modulation of gene expression, having the capacity to enhance athletic performance."  

**B. Genetic Doping**

Gene therapy treats diseases by replacing, manipulating, or supplementing nonfunctional genes. It originated when scientists searched for treatments for diseases such as muscular dystrophy, diabetes, and other genetically-based illnesses. Studies of gene therapy have been around for decades, but recent developments have made gene transfer much more effective. Medical successes in this field have captured the interest of athletes looking for ways to improve performance potential through gene therapy techniques.

Scientifically, gene therapy involves injecting synthetic genes into muscle cells, where they become indistinguishable from the receiver’s DNA. The synthetic genes work to slow muscle atrophy, speed up metabolism, and increase muscle mass. When tested on mice, gene therapy produced “marathon mice” that ran further and for a longer period of time than mice without the therapy. The genetic alteration in mice not only improved endurance, but also kept inactive mice that were fed a high-fat diet from becoming obese. The genes essentially

35. Both blood doping and the use of EPO work to increase the level of oxygen-carrying haemoglobin in the blood, which in turn increases endurance. World Anti-Doping Agency, A Brief History of Anti-Doping, supra note 2.
38. Id.
39. Id.
41. Id.
mimic exercise, with no physical effort required.\textsuperscript{42}

Dr. Lee Sweeney has experimented with genes that produce insulin-growth factor one (IGF-1), which helps muscles grow and repair themselves.\textsuperscript{43} The genes stimulate muscle growth by producing more IGF-1 than the body would normally produce, and are carried into the body by a harmless virus.\textsuperscript{44} Such breakthroughs offer hope for diseases of the metabolism, such as obesity and heart disease, but also serve as a powerful temptation for athletes looking to add muscle quickly and increase endurance.\textsuperscript{45}

Although gene therapy has evolved significantly in recent years, the science is still immature in its application to humans.\textsuperscript{46} Gene therapy is very early in development and is highly experimental.\textsuperscript{47} Potential adverse effects are unknown.\textsuperscript{48} Some fear that cancer could be a long-term side effect, although many athletes may be willing to take the risk for the short-term gratification the technology could provide.\textsuperscript{49} The risks were demonstrated in French clinical trials.\textsuperscript{50} Eleven boys successfully received gene therapy to replace missing proteins which allowed their immune systems to function properly. Three of the boys contracted leukemia, one of whom died.\textsuperscript{51} Studies of gene therapy have been conducted mostly in mice, which have about a two-year lifespan.\textsuperscript{52} The mice have died before the long-term effects of the therapy have been discernable.\textsuperscript{53} A twenty-year-old athlete who uses gene therapy to enhance athletic performance, however, has an exponentially longer life expectancy during which long-term effects may manifest.\textsuperscript{54}

\begin{thebibliography}{9}
\bibitem{id} Id.
\bibitem{supra22} Van Valkenburg, supra note 22.
\bibitem{id} Id.
\bibitem{supra40} Reynolds, supra note 40; see also id.
\bibitem{supra22} Van Valkenburg, supra note 22.
\bibitem{id} Id.
\bibitem{id} Id.
\bibitem{id} Id.
\bibitem{id} Id.
\bibitem{id} Id.
\bibitem{id} Id.
\bibitem{id} Id.
\bibitem{id} Duncan Mackay, The Race Hots Up to Destroy Genetic Monsters: Gene Doping is the Ultimate in Cheating, THE GUARDIAN (London), Apr. 29, 2005, at 32.
\bibitem{id} Id.
\bibitem{id} Id.
\bibitem{id} Id.
\end{thebibliography}
Many geneticists foresee the technology becoming available in five to ten years, while others predict the 2008 Beijing Olympics will be the first Olympic Games with genetically enhanced athletes. A March 2006 case in Germany, however, suggests that some athletes might already be engaging in genetic doping. A German running coach, Thomas Springstein, was convicted of doping charges and given a suspended 16-month jail sentence and 150 hours of community service for giving performance-enhancing drugs to teenagers. Springstein is also suspected of being involved in genetic doping. A search of Springstein’s e-mail inbox showed references to Repoxygen, a banned substance meant to be used in gene therapy to treat patients with anemia. Repoxygen increases the amount of oxygen the blood can deliver to the muscles by inducing a release of EPO. Synthetic EPO is already banned among athletes, but Repoxygen teaches human cells to produce EPO naturally, requiring no synthetic EPO. This raises suspicions about whether genetic doping took place at the 2006 Torino Olympics, which began just a few weeks after evidence was presented in Springstein’s case.

The science required to perform genetic doping is not very complicated and could be duplicated by first-year college students, provided they have enough money to obtain necessary equipment. Such a lab would only cost approximately $10 million to start, and the demand would be great. Athletes are willing to spend a lot for an opportunity to improve performance since winning an event usually leads to greater fame and money. With multi-million dollar contracts and glory at stake, some athletes may view doping as a smart investment. Athletes by nature tend to be highly motivated and

55. Van Valkenburg, supra note 22.
57. German Coach Suspected of Genetic Doping, DEUTSCHE WELLE, Nov. 2, 2006, at <www.dw-world.de/dw/article/0,2144,1890782,00.html> [visited Nov. 13, 2006] [hereinafter “DEUTSCHE WELLE”].
59. DEUTSCHE WELLE, supra note 57.
60. Id.
61. Id.
62. Van Valkenburg, supra note 22.
willing to take risks, and information about gene therapy is easily found in medical and scientific literature.\textsuperscript{64}

Genetic doping may be an enticing method for athletes to enhance performance because current technology does not detect genetic doping in humans. Since an actual gene is added to the body, it is nearly indistinguishable from naturally occurring genes.\textsuperscript{65} This is unlike traditional doping methods, which are detectable when a desired substance or hormone is added to the body. Genetic doping causes the body to naturally produce desired substances. Not only are the genetic changes nearly undetectable, but they are also permanent.\textsuperscript{66} If an athlete was enhanced by genetic doping, she would not have to worry about obtaining drugs or steroids, storing them, hiding them, taking them routinely, suffering side effects, or testing positive in blood and urine tests.\textsuperscript{67}

Athletes could implement genetic doping in a variety of ways. Some athletes with injuries in a particular part of the body might use genetic doping to promote muscle growth in order to speed healing and repair damaged muscles.\textsuperscript{68} Others might use it to strengthen a muscle they consider weak, thus creating an advantage over others who have untreated weaknesses.\textsuperscript{69} Athletes desiring to enhance performance by increasing their number of red blood cells might choose to inject themselves, not with EPO itself, as in the past, but with the gene that produces the EPO, causing the body to naturally produce more red blood cells.\textsuperscript{70}


\textsuperscript{65} Owen Slot, Highs, Lows, and Dangers: Why Would-be Dopers Need to be Nipped in the Bud, \textit{THE TIMES} (London), Feb. 9, 2006, at 82.


\textsuperscript{67} Id.

\textsuperscript{68} Murray, \textit{supra} note 52.

\textsuperscript{69} Id.

\textsuperscript{70} Id.
II. The Hierarchy of Anti-Doping Authority in International Sports

A. International Olympic Committee

Over the last decade, international sporting organizations have implemented many measures with goals of increasing and unifying efforts to prevent doping. The primary anti-doping authority is the Olympic Movement, led by the IOC. The Olympic Movement groups together all those who agree to follow the Olympic Charter and recognize the authority of the IOC. Members include IFs, the National Olympic Committees (NOCs), the Organizing Committees of the Olympic Games, athletes, judges and referees, associations and clubs, as well as all other organizations and institutions recognized by the IOC. The IOC, an international nongovernmental, nonprofit organization, serves as an umbrella over the Olympic Movement, and its primary responsibility is to supervise the Olympic Games. The IOC cites among its priorities as encouraging the participation of women in sports, promoting sports ethics, and protecting athletes.

The IOC includes various commissions which meet to study specific subjects and make recommendations. One such commission is the Medical Commission, created in 1967 to deal with the increasing problem of doping in sports. The Commission's fundamental goals include protecting the health of athletes, respecting both medical and sports ethics, and equality for all competing athletes. The IOC Medical Commission also looks for alternatives to doping, such as sports medicine, biomechanics, physiology applied to sports, nutrition, and other sports sciences.

73. Id.
77. Id.
78. Id.
The Medical Commission also represents the IOC in the World Anti-Doping Agency’s committees.

**B. International Sports Federations**

IFs are nongovernmental organizations that administer sports at the world level in affiliation with national federations administering respective sports.\(^79\) IFs must conform their statutes, practices, and activities with the Olympic Charter in order to be recognized by the IOC and participate in the Olympic Games.\(^80\) IFs have the responsibility of managing and monitoring everyday operations of the world’s various sports disciplines, creating rules for the sports, holding competitions, and choosing criteria for Olympic team selections.\(^81\) IFs encompass all sports that compete in the summer and winter Olympics, as well as other recognized sports, ranging from air sports to orienteering to wushu.\(^82\)

**C. National Olympic Committees and Governing Bodies**

NOCs promote the fundamental principles of Olympism at a national level and are committed to the development of sports in their respective countries.\(^83\) Only a NOC is authorized to select and send teams and competitors to participate in the Olympics.\(^84\) National Governing Bodies (NGBs) perform a similar role to NOCs in most countries.\(^85\) During Olympic years, NOCs take over NGB activities, and in some countries, as in the United States, the NOCs always have control over the NGBs.\(^86\)

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80. Id.
81. Id.
82. Id. Orienteering is a sport involving navigation using maps and compasses, often while engaging in other physical activities, such as running, biking, and skiing. See generally International Orienteering Federation, at <www.orienteering.org> (visited Jan. 4, 2007). Wushu is a sport based on traditional Chinese martial arts. See generally Wikipedia, at <en.wikipedia.org/wiki/Wushu> (visited Jan. 4, 2007).
84. Id.
86. Id.
D. Court of Arbitration for Sport

The IOC recognizes several other organizations, including the Court of Arbitration for Sport (CAS), which handles legal problems facing athletes. Many NOCs and all but one Olympic IF recognize the jurisdiction of the CAS and include arbitration clauses in their governing statutes which refer disputes to the CAS.87

E. World Anti-Doping Agency

In 1999, shortly after the doping events that shook the cycling world, the IOC called for a World Conference on Doping in Sport in Lausanne, Switzerland, to combat the phenomenon of doping in sports.88 The Conference produced the Lausanne Declaration on Doping in Sport, creating the World Anti-Doping Agency (WADA), which was fully operational by the Sydney Games in 2000.89 WADA is an independent agency whose mission is to promote and coordinate the international fight against doping.90

WADA’s mission is to coordinate the global fight against doping with the creation of a three-level World Anti-Doping Program (WADP).91 In 2004, WADA implemented the first level: the World Anti-Doping Code (the Code). The Code is the core document that provides the international framework for anti-doping policies, rules, and regulations within sports organizations and among public authorities.92 Levels two and three of the WADP are the International Standards and the Models of Best Practice, respectively.93 The International Standards deal with the technical and operational aspects of anti-doping programs, such as testing and laboratories.94 The Models of Best Practice offer recommendations for implementing the Code within rules and regulations of anti-doping programs and offer model rules, guidelines, and sample forms

88. World Anti-Doping Agency, WADA History, supra note 34.
89. Id.
90. Id.
93. Harmonization, supra note 91.
94. Id.
and instructions.\footnote{Id.} The Code and the International Standards are mandatory for participation in the WADP.\footnote{Id.} Every NOC and virtually every sporting organization has accepted the Code,\footnote{Id.} and most nations have an anti-doping organization to implement the Code.\footnote{Id.} Many governments cannot be legally bound by the Code since it is a nongovernmental document. Pursuant to the Code, such governments have drafted an International Convention Against Doping in Sport, which the General Conference of UNESCO adopted in October 2005, to allow formal acceptance of the Code.\footnote{Id.}

III. The Anti-Doping Regime Prior to Genetic Doping

A. The Application of Anti-Doping Rules

The fight against doping is the number one priority for the IOC.\footnote{Id.} The IOC President, Jacques Rogge, has established a “zero-tolerance” policy regarding doping.\footnote{Id.} All athletes participating in the Olympic Games must comply with the Olympic Charter and the applicable rules of the IF, as approved by the IOC.\footnote{Id.} Notably, the IOC requires athletes, coaches, instructors, officials, and all medical and paramedical staff working or dealing with the athletes participating or preparing for Olympic sports competitions, to comply in all aspects with the Code.\footnote{Id.} As part of the Code, WADA

The IOC, IFs, and NOCs maintain their respective power and responsibility to apply these rules in accordance with their own procedures, and in cooperation with WADA.\footnote{105. FACTSHEET, supra note 100, at 1.} IFs and NOCs have the responsibility to determine whether an athlete has violated a rule outside of the Olympic Games period. During the Olympic Games period, the IOC holds this responsibility.\footnote{106. Id.} The IOC, IFs, and NOCs submit authority for final appeals to the CAS, after their own procedures have been exhausted.\footnote{107. Id.} Specific procedures have been established for the time during Olympic Games competition.\footnote{108. Id.}

\section*{B. Anti-Doping Testing Procedures During the 2006 Torino Olympic Games}

During the 2006 Torino Olympic Games, anti-doping testing was carried out by the IOC Medical Commission. An athlete received notification telling him that he was selected to submit to a doping control test.\footnote{109. Id.} The top five athletes in each event were automatically selected, along with two other randomly selected athletes.\footnote{110. Id.} Once the athlete reported to the drug control station and was identified, he gave either a urine or blood sample for testing.\footnote{111. Id. at 3.} If the result was abnormal and the athlete did not have a Therapeutic Use Exemption, then the Medical Commission Chairman forwarded the information to the IOC President.\footnote{112. Id.} The IOC President immediately appointed a Disciplinary Commission, and the athlete and the athlete's NOC were notified and summoned to attend a hearing by the Disciplinary Commission.\footnote{113. Id. at 3-4. Torino was the first Olympics where blood samples were taken.} Depending on the situation, either the Disciplinary Commission or the IOC Executive Board made a decision about
whether and how the athlete would be sanctioned. The result was then forwarded to the athlete and his NOC. The athlete could then appeal the decision to the CAS, which has an ad hoc division during the period of the Olympic Games. In order to be eligible for the Olympics, all athletes must agree that any dispute shall be submitted exclusively to the CAS.

C. Procedures for Handling Violations During Olympic Games

Once an athlete tests positive for doping, the Chairman of the Disciplinary Commission may provisionally suspend the athlete until the Disciplinary Commission or IOC Executive Board pronounces its decision. The Disciplinary Commission may also provisionally suspend any other person (the athlete’s coach, trainer, doctor, etc.) who is subject to IOC jurisdiction and who may have contributed to the apparent doping violation. In accordance with the IOC’s zero-tolerance policy, a violation of anti-doping rules automatically leads to disqualification of the individual result obtained in the competition, including forfeiture of any medals, points, or prizes. The provision is based on strict liability, whereby fault is not considered in determining a violation. If the violation is found before participation in a competition or in between competitions at the Olympic Games, the IOC may declare the athlete ineligible for future competitions and Olympic Games.

Under the World Anti-Doping Code, most first violations carry a mandatory period of ineligibility of two years, and a second violation results in lifetime ineligibility, unless an athlete can show that she bears no fault or negligence. The mandatory period of ineligibility may be reduced by up to one half if the athlete proves on a balance of

114. Id.
115. Id.
118. Id. at 13.
119. Id. at 14.
120. Id.
121. Id.
probabilities that she bears no significant fault. Additionally, the athlete may be subject to sanctions outside of the Olympics by the relevant IF. While the IOC does not impose criminal liability, violators are often criminally prosecuted in many countries.

D. Violations Based on Circumstantial Evidence

An athlete surprisingly does not have to fail a doping control test to be found in violation of anti-doping rules. Circumstantial evidence may be enough to sanction an individual for the following “non-analytical” violations: use or attempted use of a prohibited substance or method; refusing, or failing without compelling justification, to submit to sample collection after notification, violating applicable requirements regarding athlete availability for out-of-competition testing; tampering, or attempting to tamper, with any part of doping control; possessing prohibited substances and methods; and trafficking in any prohibited substance and method.

Additionally, athlete support personnel found to have administered or attempted to administer a banned substance or method may also be sanctioned under the Code. Any type of complicit behavior leading to a violation or an attempt to conceal the use of prohibited substances or methods is prohibited.

E. Therapeutic Use Exemptions

Athletes who wish to use a prohibited substance or method for a legitimate medical reason other than simply to enhance performance may apply for a Therapeutic Use Exemption (TUE). Under the World Anti-Doping Code, WADA has set forth International Standards for granting TUEs. WADA has delegated this responsibility to the appropriate IF for international-level athletes and to National Anti-Doping Organizations for national-level athletes and other athletes subject to doping control under the

123. Id. at art. 10.5.
124. FACTSHEET, supra note 100, at 1.
125. Italy to Treat Doping as Criminal Offense at Turin Olympics, TAIPEI TIMES, Dec. 21, 2005, at 20.
127. Id.
128. Id.
129. WORLD ANTI-DOPING CODE, supra note 122, at art. 4.4.
Requirements for obtaining a TUE are: the athlete would experience significant health problems without taking the prohibited substance or method; the therapeutic use of the substance or method would not produce significant enhancement of performance; and there is no reasonable therapeutic alternative using the otherwise prohibited substance or method.\textsuperscript{131} When a TUE is granted, the IF or National Anti-Doping Organization must report it to WADA.\textsuperscript{132} WADA may then review the granting of any TUE to an athlete who is included in his National Anti-Doping Organization’s Registered Testing Pool.\textsuperscript{133} An athlete who has been denied a TUE may also request review by WADA, which may reverse the decision.\textsuperscript{134}

IV. Battling Genetic Doping

A. The Pressure to Win May Fuel Genetic Doping

Why do so many athletes resort to doping? The increase in doping over the last few decades may be attributed to a variety of sociological and psychological factors. First, the greater availability and greater effectiveness of medications has played a role.\textsuperscript{135} Society has generally become more comfortable with daily use of pharmaceuticals for a range of ailments. Even individuals who are not ill often try to better themselves physically with substances such as herbal supplements, weight loss pills, or Botox injections. Drugs are now more refined and usually have less side effects. For many athletes, the potential benefits of performance-enhancing drugs outweigh any potential side effects. Athletes of all ages and stages of athletic competition desire these drugs. Sports medicine is now an essential part of an athlete’s preparation, especially at elite levels of competition.\textsuperscript{136}

\begin{itemize}
  \item \textsuperscript{130} Id.
  \item \textsuperscript{131} World Anti-Doping Agency, International Standard for Therapeutic Use Exemptions, at \textless www.wada-ama.org/en/dynamic.ch2?pageCategory.id=373 \textgreater (visited Nov. 8, 2006) [hereinafter “TUEs”].
  \item \textsuperscript{132} \textsc{World Anti-Doping Code}, \textit{supra} note 122, at art. 4.4.
  \item \textsuperscript{133} Id.
  \item \textsuperscript{134} Id.
  \item \textsuperscript{136} Id.
\end{itemize}
Sports are more about winning than competing. A good effort is not admirable compared to a winning or record-breaking effort. From a political perspective, nations have encouraged athletes to triumph in international athletic competitions because winning medals is a symbol of both national pride and superiority over other nations. Victorious athletes are treated as national heroes, and are rewarded as such, sometimes by governments themselves. Nations have gone so far as to hide systematic doping and arrest those who expose doping scandals. Athletes who win are often rewarded with sponsorships deals in the form of product endorsements and television commercials worth millions of dollars, in addition to contracts with professional sports organizations.

B. Is Genetic Doping a Fight Worth Fighting?

Should genetic doping even be regulated? Many people and organizations such as WADA certainly do not want genetic doping to become a mainstream reality in sports. By labeling genetic modification as a form of “doping,” WADA has shown a negative perspective toward the practice. Opponents argue that genetic modification should not be regulated because there is nothing wrong with it. Competing ethical, legal, and moral arguments exist on both sides.

Whether genetic doping should be regulated depends on one’s personal view of sports. Individuals who oppose genetic doping often

137. Id. See also Trip Gabriel, China Strains for Olympic Glory, N.Y. TIMES, Apr. 24, 1988, § 6 (Magazine), at 30 (Chinese gymnastics coach says that “sports is just like diplomacy,” and “when we get good marks, it is a window the world can look into and tell a lot about our country. It can tell we are well fed, we are stabilized politically, we are developing quickly, for otherwise it would not be possible to train athletes and be advanced in sports”).

138. Id. Gabriel describes Chinese athletes’ rewards after winning Olympic medals: apartments and houses for athletes and family members filled with furniture and appliances, and celebrity status for a world-champion ping-pong player.

139. Dryden, supra note 63, at 20-21 (describing a 1994 state-sponsored doping program in Chinese swimming, and the subsequent arrest of the Chinese journalists who broke the story and were charged with “denigrating the reputation of Chinese athletes”).

140. Waddington, supra note 135, at 3.

141. For an excellent overview on a wide range of ethical arguments regarding genetic doping presented in this subsection, see Ted Friedmann, Chairman, Potential for Genetic Enhancements in Sports, Address at the Fifth Meeting of the Recombinant DNA Advisory Committee (July 11, 2002), available at <www.bioethics.gov/transcripts/jul02/session4.html>.
hold a romantic view of sports and believe that the body should be untainted and success should only be based on hard work and natural ability. Others view sports as simply entertainment and an economically viable industry. Proponents of this view tend to believe that biotechnology and bioengineering should be fully integrated into sports, and that an athlete’s decision to physically alter himself is a private decision.\textsuperscript{142}

The public may decide to accept genetic doping as a legitimate achievement of science and technology, or it may determine that international sporting bodies have a greater interest in protecting the health of athletes. In weighing these opposing interests, one might compare the right of an athlete to permanently alter her body to an aspiring actor’s decision to have cosmetic surgery. Genetic enhancement may be simply another tool in the quest for success, and those willing to take more risks and do “whatever it takes” will come out on top. On the other hand, genetic enhancement may be considered an invasive, undeveloped science which may have grave consequences.

It is difficult to imagine a world where both perspectives are fully satisfied. If the individualistic view – which emphasizes personal choice – triumphs, other athletes may be deprived of their perceived right to compete in a natural, drug-free sports world. On the other hand, athletes who simply compare genetic enhancement to the development of technically advanced equipment, such as improved skis or hockey sticks, would perceive an injustice if denied their right to access that advanced technology. It is important to consider which matters most: the ultimate end result or the means of achieving that result.

There is also an inherent discord in international sports between athletes who have achieved success through hard work and individuals with a natural gift for athletics. Many argue that everyone should start on a level playing field, free of performance-enhancing substances and methods, in order to promote fair play.\textsuperscript{143} Others argue that the playing field is never level because we are not all born with the same natural athletic abilities, or raised in the same

\textsuperscript{142} For a variety of arguments that genetic enhancement should be allowed in sports, see Andy Miah, \textit{Genetically Modified Athletes in Athens? Bring Them on}, \textit{The Observer}, Aug. 1, 2004, at 9, available at <observer.guardian.co.uk/sport/story/0,6903,1273665,00.html>.

\textsuperscript{143} King Kaufman’s Sports Daily, \textit{supra} note 56.
environment, and that, regardless, athletes who make it to the level of international sports are not "normal." Performance-enhancing measures may be a way to level the playing field and thus promote fair play. Sports organizations already make distinctions in an attempt to level the field. For example, athletes are separated based on gender, age, physical or mental handicaps, and weight classes.

On the other hand, more naturally talented athletes that use performance-enhancement methods create an even larger gap between themselves and those less gifted. Some may view genetic doping as a "competitive" practice since it advances more athletes who would not otherwise be able to contend at the top to participate at an international level. Alternatively, others may consider genetic doping to be an "anti-competitive" practice because athletes who can afford to purchase new technological advances will not need to strive for achievement through hard physical work.

While valid arguments exist on both sides of the debate over the ethical merits of genetic doping in sports, the remainder of this note assumes that regulation and restriction is needed. This is the view that international anti-doping authorities have taken.

C. The Race to Detect Genetic Doping

Although WADA does not believe that genetic doping is a reality quite yet, the organization regards such doping as a huge threat deserving of attention. WADA held the Banbury Conference in New York in 2002 specifically to discuss the issue of genetic doping. The conference was attended by leaders in both sports and science. Richard W. Pound, WADA’s president, believes that being proactive, rather than reactive, regarding genetic doping is imperative. The conference thus aimed to enhance awareness of genetic doping and to disseminate information between scientists and members of the sports world, with the overarching goal of preventing genetic doping. As a result, genetic doping made its

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144. Id.
145. Id.
147. PLAY TRUE 2005, supra note 52, at 1.
148. Id.
149. Id. at 2.
150. Id.
debuted on WADA's 2003 Prohibited List of Substances and Methods.\textsuperscript{151}

In 2004, WADA also formed a genetic doping panel composed of five of the top researchers in various fields of genetics.\textsuperscript{152} The panel advises WADA's Health, Medical and Research Committee to provide the committee with current information on advances in genetic doping.\textsuperscript{153} WADA is currently sponsoring a number of projects aimed at the detection of genetic doping.\textsuperscript{154} For instance, WADA has engaged the very individuals who created genetic therapy to find a way to detect it in genetically doped athletes.\textsuperscript{155} In collaboration with the Karolinska Institute and the Swedish Sports Confederation, WADA in December of 2005 held a workshop referred to as the Stockholm Symposium.\textsuperscript{156} The workshop announced the Stockholm Declaration on Gene Doping, which makes recommendations regarding procedures, progress, and educational goals.\textsuperscript{157}

\textbf{D. Regulating the Science of Gene Therapy}

Gene therapy has the potential to save many lives and improve the quality of life for individuals with a variety of debilitating diseases. Research involving gene therapy should not be halted as a result of fear of misuse in the athletic arena. Gene therapy research does, however, need to be regulated in order to prevent it from emerging in sports in the form of genetic doping. Results of WADA's Banbury Conference calls for governments to "expedite the development of a global social framework for the application of genetic transfer technologies that address the potential misuse of these technologies in sport and a publicly stated deadline for the

\begin{itemize}
\item 151. Pound, \textit{supra} note 147.
\item 152. PLAY TRUE 2005, \textit{supra} note 52, at 8.
\item 153. \textit{Id}.
\item 155. \textit{Id}.
\end{itemize}
adoption of that framework.'

Recommendations agreed upon during the Stockholm Symposium state:

[E]xtensive and rigorous regulatory mechanisms are needed to ensure safety of research subjects and patients. Gene transfer procedures in human beings must:

a) follow accepted national and international codes and principles governing experimentation and clinical research in human subjects; and

b) be performed strictly in accordance with local and national rules and regulations for gene transfer into human subjects.\(^{159}\)

The United States has stringent rules regarding oversight of gene transfer studies.\(^{160}\) All gene transfer studies in humans must be approved at both local and national levels.\(^{161}\) At a local level, hospitals and institutional committees must approve such studies. At a national level, the Food and Drug Administration and, in most cases, the Recombinant DNA Advisory Committee of the National Institute of Health must approve these studies.\(^{162}\) Other countries where experimental clinical studies are being carried out also regulate gene transfer therapy. Those countries include England, Germany, France, Italy, Sweden, Japan, China, and Australia.\(^{163}\)

Despite regulations and health concerns, rogue labs will likely make experimental genetic doping available to athletes.\(^{164}\) Unregulated labs may not be concerned with safety or obtain informed consent from athletes.\(^{165}\) Many believe that the experimental use of gene therapy technology should be grounds for punishing those administering such treatment.\(^{166}\) The Stockholm Symposium recommends that a lack of compliance with standards and rules of clinical research and gene transfer procedures should be considered medical malpractice and/or professional misconduct.\(^{167}\)

\(^{158}\) PLAY TRUE 2005, supra note 52, at 1.
\(^{159}\) Stockholm Declaration, supra note 157.
\(^{160}\) Pound, supra note 147, at 1.
\(^{161}\) PLAY TRUE 2005, supra note 52, at 4.
\(^{162}\) Id.
\(^{163}\) Id.
\(^{164}\) Id.
\(^{165}\) Id.
\(^{166}\) Id.
\(^{167}\) Stockholm Declaration, supra note 157.
The Stockholm Symposium also recommends developing appropriate sanction mechanisms for illegal or unethical application of gene transfer in sports.\textsuperscript{168}

The temptation for scientists and doctors to defy regulations and engage in experimental genetic doping on athletes is immense. Numerous geneticists working on this technology have received as many inquiries from athletes and coaches as they have from patients with muscular dystrophy.\textsuperscript{169} A number of individuals, including coaches, trainers, and doctors, have a personal and financial interest in the performance of each athlete. These individuals will go to great lengths to advance the success of an athlete and will exploit any loophole in regulations. The money required to set up a gene therapy laboratory is not excessive by athletic standards, especially considering the potential for tremendous payoff.\textsuperscript{170} A rogue scientist may do a substandard job of using this technology on athletes because he is attempting to evade oversight mechanisms and detection by authorities.\textsuperscript{171} As a result, athletes could end up in unsafe labs.\textsuperscript{172} Strict regulation of gene transfer therapy could actually result in more rogue labs uninterested in the health of athletes.

If WADA persists in requiring strict regulation of gene therapy research, however, the regulation should be overseen by one international body, rather than leaving regulation up to local and national governments. Like the East German government, some nations might decide that getting ahead in international competition is more important than the health of athletes, and thus employ lenient regulations. Other nations might appear to implement strict regulations in adherence to international WADA standards, yet still look the other way when it comes to top athletes. Some Olympians, therefore, would have greater access to genetic doping if their local and national rules permit greater access to the technology. Nations could decide that potential detection is a risk that should be taken in exchange for political strategy or national pride. Additionally, athletes could take advantage of a more lenient regulation policy in another country by traveling to that country, receiving therapy, and

\begin{footnotes}
\item[168]\textit{Id.}
\item[169] Mackay, \textit{supra} note 50, at 32.
\item[170] Bachman, \textit{supra} note 37.
\item[171] \textit{Id.}
\item[172] \textit{Id.}
\end{footnotes}
then returning home to compete undetected. 173

E. Testing for Genetically Enhanced Athletes

Currently, genetic doping is virtually undetectable. As previously mentioned, WADA sponsors a number of research projects aimed at devising a test for genetic doping. 174 Genetically doped muscles may be detected by biopsy, by taking a slice of the muscle at the spot of DNA injection. 175 This technique is significantly more invasive than a urine or blood sample, the current methods used to detect doping. If a biopsy were the only method for detecting genetic doping, the IOC and WADA would have to determine whether athletes should be required to submit to such an invasive test for Olympic competition. The Olympic Movement Medical Code claims that “the consent of the athletes is required for the collection, preservation, analysis and use of any biological sample.” 176 Many athletes would not voluntarily consent to invasive biopsy testing unless they were forced to do so in order to compete at an international level.

The IOC and WADA would also have to determine when such testing should be conducted. If testing were done too far in advance of competition, athletes could still have time to engage in genetic doping before competition. Because genetic doping can add muscle mass quickly, athletes could engage in genetic doping shortly before competition and still experience a significant enhancement, undetected by international authorities. Alternatively, if testing were done too close to the time of competition, athletes might not have sufficient time to recover from an invasive procedure. Such testing could compromise the performance of athletes and diminish the overall level of competition. This would not align with the IOC’s interest in fostering a high level of competition. Testing done before the Olympics also begs the question of who would be tested: a random sample, those predicted to win, or all athletes?

During the Olympics, specific procedures are followed to test the


176. OLYMPIC MOVEMENT MEDICAL CODE, supra note 1, at art. 1, § 3.6.
top five athletes in an event, plus two other randomly selected
athletes, as described above.\textsuperscript{177} These tests are often conducted in
between competitions when a single athlete is competing in multiple
events, so that violators can be caught and disqualified from further
competition in the middle of the Games. In the case of a biopsy to
detect genetic doping, the test probably could not be administered
mid-Games.

Therefore, until a less invasive method of testing for genetic
doping is devised, the IOC's mission to protect the health of athletes
would seem to disqualify testing through biopsy during the Olympic
Games. However, blood and urine samples extracted from athletes
are owned by the IOC for eight years\textsuperscript{178} and the IOC has the right to
reanalyze any sample during that time.\textsuperscript{179} If science allows for
detection of genetic doping through blood or urine analysis by 2014,
vilators who participated in the 2006 Torino Games might be
discovered without having to engage in biopsy testing.

If no viable detection method is ever available, an athlete could
still be banned for genetic doping based only on circumstantial
evidence. Currently, to find an athlete guilty of doping, no blood or
urine sample is necessary.\textsuperscript{180} Sanctions for a doping violation based on
circumstantial evidence is permitted by the Code's allowance for non-
analytical positives.\textsuperscript{181} WADA will have to determine what kind of
circumstantial evidence, if any, would be sufficient to convict an
athlete of genetic doping. Rights of due process, at least in the
United States, are implicated when imposing a sanction for genetic
doping on an athlete without conclusive evidence. The right to
compete could be denied without definitive factual substantiation. If
an athlete quickly gains significant muscle mass, increases his
endurance considerably through hard work, or recovers quickly from
an injury, he may have to worry about suspicion or conviction of
genetic doping. Accusations of doping, whether genetic or not,
almost instantaneously tarnish an athlete's reputation, regardless of
the evidence available.

WADA should promulgate and implement clear, specific, and

\textsuperscript{177} \textit{FACTSHEET}, \textit{supra} note 100, at 3.

\textsuperscript{178} \textit{WORLD ANTI-DOPING CODE}, \textit{supra} note 122, at art. 17.

\textsuperscript{179} \textit{TURIN RULES}, \textit{supra} note 117, at art. 6.5.

\textsuperscript{180} BBC Sport Winter Olympics 2006, \textit{IOC denies Austrian Ban Decision} (Feb.
24, 2006), at <news.bbc.co.uk/sport1/hi/other_sports/winter_sports/4730842.stm>
(visited Nov. 14, 2006).

\textsuperscript{181} \textit{Id.}
consistent testing programs (when available) and evidentiary requirements for genetic doping if it wants to effectively detect individuals using genetic enhancement methods. Ultimately, if society perceives testing and sanctioning methods as unfair or unreliable, people may become disillusioned with the regulation scheme. The key to enforcement and approval of a regulatory scheme is legitimacy, and without a reliable testing method WADA will have a difficult time curbing genetic doping. Thus, WADA should focus its efforts and money on finding a reliable test to control genetic doping, and then execute the test on a global level. Testing for genetic doping will probably cost significantly more than testing for traditional doping methods, so not all national anti-doping agencies will be able to adequately fund such testing for athletes. Furthermore, nations have little incentive to rigorously test their athletes and then publish results showing their athletes are genetically enhanced. This would evoke a negative public response to the country’s athletes and reputation, in addition to raising questions about why the country did not prevent the doping. In order to avoid unequal application of international regulations, WADA should compensate for national discrepancies in funding and technology by instituting a single global solution.

**F. Therapeutic Use Exemptions for Genetic Therapy**

The original purpose of genetic therapy was to control or cure serious medical conditions. Consider a hypothetical situation where a six-year-old boy, Brian, suffers from Duchenne Muscular Dystrophy. This particular type of muscular dystrophy is a result of mutations in a gene that regulates dystrophin, a protein involved in maintaining the integrity of muscle fiber. Brian’s doctor informs Brian’s parents that untreated, Brian’s disease will progress rapidly, and he probably will not be able to walk by age 12. He will also need a respirator to breathe by age 20. The doctor also tells Brian’s parents that there is a new and promising option, where a laboratory-engineered gene for dystrophin can be introduced into Brian’s body by means of a harmless virus. Brian’s parents pursue this option, and treatment

182. Opie, [*supra* note 71].
183. Van Valkenburg, [*supra* note 22].
184. PLAY TRUE 2006, [*supra* note 126, at 4].
185. *Id.*
186. For a basic overview of Muscular Dystrophy, see WEBMD, at
for Brian’s muscular dystrophy is extremely effective. Brian not only
retains muscle, but he builds muscle and grows like a normal boy.
Brian’s parents let him play sports, and he excels at long-distance
running. He trains hard and becomes stronger. By age 20, when
Brian was expected to breathe only with the aid of a respirator, he is a
world-class long-distance runner. Brian earns an opportunity to
represent the United States at the Summer Olympics, wins the silver
medal in the 10,000-meter event, and is subject to the IOC’s anti-
doping testing.

The World Anti-Doping Code espouses that the “non-
therapeutic use of cells, genes, genetic elements, or of the modulation
of gene expression, having the capacity to enhance athletic
performance, is prohibited.”187 Drawing a line between “therapeutic”
and “enhancement,” however, is virtually impossible.188 Because
Brian’s gene therapy is therapeutic, he should be allowed to compete
in international competitions. The requirements for obtaining a TUE
are that the athlete would experience significant health problems
without taking the prohibited substance or method, the therapeutic
use of the substance or method would not produce significant
enhancement of performance, and there is no reasonable therapeutic
alternative to the use of the otherwise prohibited substance or
method.189 Clearly, Brian would experience a significant health
problem had he not received the genetic therapy. For most diseases
treated with genetic therapy, there usually are not reasonable
treatment alternatives.

Some might argue that allowing an athlete who has undergone
gene therapy to compete in international sports is unfair. If a
muscular dystrophy patient receives genetic therapy to allow his
muscles to function normally, surely he would experience a
“significant enhancement of performance” as compared to an
individual with the same disease who would otherwise only be able to
breathe aided by a respirator. Furthermore, we do not know when an
athlete has been enhanced to a level beyond “normal” muscle
functioning. Do we measure “normal” against a normal Olympic
athlete, normal non-Olympic athletes, or normal non-athletes? Anti-
doping organizations must determine how much gene therapy should

<www.webmd.com/content/article/7/1680_53864.htm> (visited Nov. 8, 2006).
187. PROHIBITED LIST, supra note 36 (emphasis added).
188. D’Andrea, supra note 173, at 1671.
189. TUEs, supra note 131.
be allowed and whether WADA should grant TUEs for genetic enhancement at all. Any line drawn to distinguish therapy from enhancement seems to be arbitrary; however, WADA must draw the line somewhere based on available scientific data if it is to implement a consistent standard.\textsuperscript{\textdagger}

We can also contrast Brian’s therapeutic exemption for gene therapy with other types of enhancements that are allowed. For example, a biathlete with less than normal vision could undergo laser vision correction, resulting in better than normal vision. This athlete would undoubtedly gain an advantage in the rifle shooting aspect of the sport, yet this is not a “Prohibited Method” according to WADA. Brian’s gene therapy seems more justified and sympathetic than the biathlete’s vision correction, yet he may be banned from international sports completely, while the biathlete with nearly super-human vision would be allowed to compete. Such policies invoke issues of equal protection of the law, particularly in the United States.

TUEs are currently granted by national anti-doping agencies and IFs. In order to prevent inconsistencies in an international regulatory scheme, WADA should be the sole authority in granting TUEs for gene therapy to international-level athletes. WADA promulgates the International Standard for granting TUEs, but like any statute, these standards are open to interpretation. Some IFs and national anti-doping agencies could interpret these standards broadly while others may interpret them narrowly. If WADA is determined to keep genetic doping out of athletics, it should control the granting of all TUEs for genetic therapy, rather than merely reserving the right to review other’s decisions.

\textbf{G. Natural Genetic Mutations}

Another complication facing detection of, and sanctions for, genetic doping in athletes is that some individuals are born with natural genetic mutations that are favorable to athletics.\textsuperscript{\textdaggerdbl} For example, in 1999 a four-year-old German boy whose myostatin gene was mutated had twice the muscle mass of the average child his age.\textsuperscript{\textdaggerdbl}
Suppose that in 20 years this boy became a world class wrestler. If testing for genetic doping could not distinguish between a genetic mutation occurring since birth and one induced later in life, this boy could be shut out of competition. Even if circumstantial evidence could prove that the athlete had the characteristics of greater muscle mass since childhood, he could not prove that it was not a result of childhood genetic doping.

H. Problems with Sanctioning Genetically Doped Athletes

A significant legal concern accompanying genetic doping is that of proper sanctioning for violators. Genetic doping is permanent. Once an athlete is genetically doped, the effects of such a procedure are present for the rest of the athlete’s life. Anti-doping authorities, therefore, would have to ban an athlete for life if adhering to the espoused zero-tolerance policy. Such a policy would leave no room for a second chance or an opportunity to repent or come clean, unless a method was devised to reverse the effects of genetic doping. Currently, the World Anti-Doping Code promotes a standard two-year suspension for first-time violators. It does not take into account the permanent nature of genetic doping. Additionally, before lifetime ban policies could be imposed, the IOC would have to make sure that a foolproof test was in place. A false positive test would have severe consequences, and any procedural or analytical mistake would immediately be challenged by the athlete’s lawyers, due to the grave consequences of a false positive test.

Another consideration is the type of sanctions that may be imposed on children of one or more genetically enhanced parents. Because the new genes become part of an individual permanently, a genetically doped parent would likely produce genetically superior children.¹⁹³ It does not seem just to permanently ban such a child from participating in international sports, since the athlete himself would have done nothing wrong. As genetic enhancement techniques become available over periods of generations, determining whether an individual is genetically doped could require testing of athletes’ parents to see whether the athlete has natural mutations or inherited genetic enhancements. This would invoke further concerns regarding rights of privacy, due process, and equal protection of parents of athletes. The IOC would have to decide how to handle these

¹⁹³. Miah, supra note 142.
children, and what categories of athletes (naturally mutated or enhanced through parents) could be justifiably sanctioned.

V. Conclusion

Overall, the IOC has significantly increased its effectiveness in the fight against doping in international sports through the creation of WADA and the implementation of stricter testing procedures. The IOC and WADA will soon, however, face a new hurdle in the regulation, detection, and prevention of genetic doping. Genetic doping brings about a unique set of legal, moral, and ethical concerns that will require the IOC and other Olympic Movement organizations to make many difficult policy judgments in the fight to preserve the ideal Olympic "philosophy of life."  

Allowing one international body to create uniform regulations, testing, and standards would facilitate consistent anti-genetic doping results.

194. OLYMPIC MOVEMENT MEDICAL CODE, pmbl. § 2, supra note 1.
195. For an argument that the IOC should not impose its ethical and social policies on nations, and that regulation should not rely on one global authority, see Andy Miah, "Gene Doping" Set to be the Next Sports Scandal, THE NATION (Thail.), Aug. 20, 2005.
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